Strain differences in profiles of dopaminergic neurotransmission in the prefrontal cortex of the BALB/C vs. C57Bl/6 mice: consequences of stress and afobazole.

We found that in mice the basal activity of monoamine oxidase B (MAO-B) in the medial prefrontal cortex (mPFC) is lower in BALB/C than in C57Bl/6J mice, whereas activity of MAO-A is similar between strains. BALB/C mice, in comparison to C57Bl/6N mice, have higher basal content of dopamine in the mPFC, in both microdialysates and tissue content. Novelty stress (open field test) elicits a further increase in the microdialysate levels of dopamine in BALB/C, but not in C57Bl/6N mice; a subsequent accumulation of extracellular 3,4-dioxyphenylacetic acid (DOPAC) reaffirms the difference in catabolic capacity of monoaminergic systems between the strains. We demonstrated that in stress-susceptible BALB/C mice the novel anxiolytic afobazole, 5mg/kg, selectively mitigates trait anxiety; however it does not change the behavioral response in stress-resilient C57Bl/6N mice. Afobazole inhibits MAO-A in in vitro; it also lowers the microdialysate DOPAC levels in both strains (which testifies to its MAO-A inhibiting activity in vivo) and slightly suppresses dopamine release when elevated. Therefore, it is likely that the drug may mediate its anxiolytic activity via modulation of volume dopaminergic transmission at level of the mPFC.